CLAIMS

1. A fluid heating device comprising a housing having an internal chamber and a fluid inlet and a fluid outlet in fluid communication with said chamber; a rotor disposed centrally in said chamber and mounted for rotation within said chamber about an axis of rotation, said rotor in spaced relation to said housing to provide a generally annular passage for fluid to travel from said inlet towards said outlet, said rotor having a plurality of interior passageways formed therein and a plurality of openings formed on an exterior surface thereof confronting fluid in said passage and disposed in a plurality of circumferential rows spaced about said rotor along the longitudinal axis of said rotor, wherein rotation of said rotor causes said plurality of openings to impart heat-generating cavitation to a fluid entering said chamber.

2. The device according to claim 1 wherein said openings are disposed radially outwardly of said interior passageways and at least a proportion of said interior passageways and at least a proportion of said plurality of openings are in fluid communication.

3. The device according to claim 1, and further comprising at least one fluid throttling conduit disposed in at least one of said interior passageways.

4. The device according to claim 1, and further comprising at least one fluid throttling conduit disposed in said rotor and in fluid communication with at least one of said plurality of openings.

5. The device according to claim 1 wherein said interior passageways provide a heat transmitting surface to pre-heat at least a proportion of said fluid entering said passage.

6. The device according to claim 1 wherein said exterior surface of said rotor terminates at first and second planar end faces on said rotor, fluid from said inlet passing through at least one of said interior passageways to be pre-heated by said rotor and opening at said second planar end face of said rotor to access said passage.

7. The device according to claim 1 wherein said exterior surface of said rotor terminates at first and second planar end faces on said rotor, fluid from said inlet passing through at least one of said interior passageways to be pre-heated by said rotor and opening into said passage in spaced separation to said second planar end face of said rotor.

8. The device according to claim 1, and further comprising means to pre-heat fluid entering said chamber.

9. The device according to claim 1 wherein said interior passageways form an interior vessel for the storage of fluid, said openings disposed radially outwardly of said interior vessel and at least a proportion of said plurality of openings communicating with said vessel, said vessel at least partially evacuated of fluid during rotation of said rotor.

10. The device according to claim 8 wherein the evacuated fluid passes through at least certain ones of said openings into said passage.

11. The device according to claim 1, further comprising a drive shaft for imparting mechanical energy to said rotor, said drive shaft supported in said housing by at least two bearings, one of said at least two bearings being nearer a distal end of said rotor and another of said at least two bearings being nearer the proximate end of said rotor,

wherein said at least one of said two bearings lies axially adjacent said inlet.

12. The device according to claim 10, and further comprising a fluid seal disposed in said housing and surrounding said drive shaft, said seal and said inlet disposed on opposite axial sides of said housing.

13. The device according to claim 12, and further comprising means to cool said seal.

14. The device according to claim 1 wherein said exterior surface of said rotor terminating at first and second planar end faces on said rotor, and wherein one of said plurality of interior passageways is a longitudinal passageway extending along said axis of rotation for a distance greater than the distance between said first and second planer end faces; said rotor further comprises a fluid entrance port disposed axially adjacent said inlet, said entrance port communicating with said longitudinal passagway.

15. The device of claim 1, and further comprising a plurality of annular fluid distribution grooves in said rotor, wherein a groove interconnects all openings in a respective circumferential row.

16. The device of claim 1, and further comprising a plurality of annular fluid distribution grooves in said rotor, wherein a groove connects all openings in a respective circuferential row to said interior passageway.

17. The device according to claim 1 wherein at least one row of said openings are circumferentially spaced at uniform intervals.

18. The device according to claim 1 wherein at least one row of said openings are circumferentially spaced at variable intervals.

19. The device according to claim 1 wherein at least one row of said openings are circumferentially displaced from any other row of said openings.

20. The device according to claim 1 wherein some of said openings are formed as bellmouthed holes, the relative diameter of the bellmounth exceeding the diameter closer to the axis of rotation.

21. The device according to claim 1 wherein some of said openings are formed a radial holes, the depth of which exceeding in distance to a greater dimension than the radius dimension of said rotor.

22. The device according to claim 1 wherein some of said openings are formed as radial holes, the depth of which exceeding in distance to a greater dimension than the radius dimension of said rotor and where said radial holes interconnect with each other internally of said rotor to form a continuous pathway for the transmission of shock waves.

23. The device according to claim 1 wherein at least one row of said openings are fluidly interconnected by an annular groove disposed in the interior of said rotor, and further comprising at least one fluid throttling conduit disposed radially inwardly of said annular groove to be nearer said axis of rotation than said openings.

24. The device according to claim 1, and further comprising means to prime said chamber with priming fluid.

25. The device according to claim 1 wherein said fluid inlet and said fluid outlet each opening exteriorily of said housing.

26. The device according to claim 1 wherein said housing includes a rear housing member and wherein said fluid inlet is disposed in said rear housing element in a location radially closer to said axis of rotation than said fluid outlet; and further comprising a partitioning wall in said rear housing member and separating said fluid inlet from said internal chamber, at least one port formed in said partitioning wall and fluidly linking said inlet to said internal chamber.

27. The device according to claim 1 wherein said housing includes a rear housing member and wherein said fluid inlet is disposed in said rear housing element in a location radially closer to said axis of rotation than said fluid outlet; further comprising a partitioning wall in said rear housing member and separating said fluid inlet from said internal chamber; and further comprising an entrance port in said rotor and an axial end of said rotor extending into said partitioning wall to communicate said entrance port with said fluid inlet.

28. The device according to claim 1 wherein said fluid entering said internal chamber undergoes a pre-heating stage and a primary heating stage, said interior passagways providing said pre-heating stage and said annular passage providing said primary heating stage.

29. The device according to claim 1 wherein said chamber is a generally a cylindrical volume and said rotor is in the form of a cylindrical element.

30. The device according to claim 1 wherein said fluid inlet overlies said axis of rotation.

31. A method of heating fluids, comprising causing a fluid to enter an inlet of a device comprising a housing having an internal chamber, a rotor mounted for rotation within said chamber about an axis of rotation, said inlet and an outlet each opening exteriorly of said housing, said rotor having an interior heat conducting surface therein for pre-heating fluid entering said chamber and a plurality of openings formed on an exterior surface thereof confronting fluid entering said chamber, while rotating said rotor at a speed sufficient to cause said plurality of openings to impart heat-generating cavitation to a fluid entering said chamber.

32. A method of heating fluids according to claim 31 wherein said inlet is disposed radially closer to said axis of rotation than said outlet, wherein said method further comprises causing movement of said fluid entering said chamber while rotating said rotor.

33. A method of heating fluids, comprising causing a fluid to enter an inlet of a device comprising a housing having an internal chamber, a rotor mounted for rotation within said chamber about an axis of rotation, said inlet and an outlet each opening exteriorly of said housing, said rotor having an interior vessel for the creation of variable vacuum conditions and a plurality of openings formed on an exterior surface thereof confronting fluid entering said chamber, while rotating said rotor at a speed sufficient to cause said plurality of openings to impart heat-generating cavitation to a fluid entering said chamber.

34. A method of heating fluids according to claim 33 wherein said vessel is in communication with at least some of said openings, wherein said method further comprises causing a pressure drop in said vessel while rotating said rotor.